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ABSTRACT

This study investigated student use of commercial note-taking services as a predictor of class attendance and examined the effects of their use on academic performance in science courses. The study draws upon results of a survey distributed to 1,874 undergraduate students (response rate 58.2 percent) enrolled in two large-lecture chemistry courses during the fall 1995 term at a large midwestern research university, and examines the relative influence of two independent variables (student personal characteristics and student academic background) vis-a-vis commercial course note use on student academic performance. The initial section of the paper presents an extensive literature review of the social environments of learning, student academic behaviors, and commercial note-taking services. This is followed by sections discussing the conceptual framework of the study, the research questions to be answered, the methodology used, and study limitations and results. The study found little correlation between students' academic backgrounds and the likelihood of using commercial note-taking services; it also found no correlation between the use of note-taking services and poor class attendance; however, the study did show a negative effect of the use of commercial note-taking services on student academic performance. Data tables are appended. (Contains 23 references.) (CH)

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Commercial note-taking services:

Effects on attendance and academic performance

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Dolores Vura
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Abstract

Commercial note-taking services are a recent phenomenon on some campuses, especially those that employ selective admissions or are characterized by an academically competitive culture. In response to these services, faculty and academic administrators have voiced concerns regarding class attendance and academic performance, among others. This exploratory study focused on students who used commercial note-taking services, investigated their use as a predictor of class attendance, and examined the effects of their use on academic performance in science courses.

Commercial note-taking services:

Effects on attendance and academic performance

INTRODUCTION

The enhancement of student learning is a primary goal of colleges and universities. Pascarella and Terenzini (1991) reviewed the research literature on the influence of college on student learning in general, and on student subject matter competence in particular, and identified that "students appear to make statistically significant ... gains during college in many areas of subject matter knowledge and academic skills." (p. 63) Furthermore, their review differentiated between types of studies that have been conducted to investigate these gains, including those that assess the net effects of college, within-college effects, between-college effects, instructional factors, and long-term effects of college.

In the context of this goal of enhancing student learning, it is important to consider the increasing amounts and complexity of information presented in U.S. higher education. Stark and Lattuca (1997) asserted that "college students face the contradictory demands of gaining more specialized knowledge and learning how to retrieve and interpret a broader knowledge base that extends beyond their own expertise." (p. xiii) College students are presented with myriad challenges to the age-old task of learning large amounts of class material over the course of one academic term. As a result, there is burgeoning research and publication in concomitant

areas such as study skills strategies, student academic performance, and degree aspirations and attainment.

Research in these areas has also spurred investigations of student motivation. One recent report (Gose, 1998) on results from the 1997 UCLA Higher Education Research Institute's CIRP survey identified that more college freshmen than ever believe that an education is to be endured rather than enjoyed. More specifically, the proportion of freshmen who reported having been bored by their high-school classes is at an all-time high. This report also identified that a record number of freshmen plan to pursue a graduate degree; approximately 39% aspire to earn a master's degree, and 15% plan to earn a Ph.D. However, this raises serious questions regarding interest in learning for its own sake because only 34% of this year's freshmen identified that they had spent at least six hours per week studying or doing homework. This figure is down from 44 per cent a decade ago (Gose, 1998).

In another recent view, Levine and Cureton (1998) asserted that higher education is not as central in the lives of today's undergraduates as it was to previous generations of students. (p. 14) They attributed a majority of this to demographic changes; older students, part-time students, and students with children often have different types of relationships with their institutions than did their more traditional predecessors in previous generations.

LITERATURE REVIEW

Three bodies of literature provide background and context for this study as applied to academic performance; (a) social environments of learning, (b) student academic behaviors, and (c) commercial note-taking services.

Social Environments of Learning

Social environments of learning refer to the various factors (e.g., group interaction, cognitive and affective outcomes) that influence student perceptions of the classroom environment both in, and related to specific courses. Walberg (1969) investigated this concept

of social environments of learning, and constructed it as student perceptions of levels of classroom (a) organization, (b) formality, (c) goal direction, (d) subgrouping and diversity, and (e) intimacy and satisfaction.

Another aspect of the social environments of learning has addressed issues of the number of students enrolled, or class size. This research is particularly notable for the purposes of this study, because commercial note-taking services must be marketed to larger segments of the student population in order to be economically viable. As a result, this strategy involves large lecture courses with large numbers of enrolled students from which to market the coursenotes services. Since commercial note-taking services are a new phenomenon on college campuses, however, it is understandable that existing research has focused on student satisfaction with, and evaluation of large lecture courses, among other topics. Gilmore, Swerdlik and Beehr (1980) investigated the effects of class size on student ratings of psychology courses by examining student perceptions of instructor flexibility and prompt grading and return of assignments and exams. The authors found that class size and student major do influence course evaluations, but that the findings must not be overgeneralized. Meredith and Ogasawara (1982) compared the observed and preferred size of lecture classes among college students, and identified three primary findings: (a) increased class size was associated with a decrease in group interaction, (b) observed class size was only slightly correlated with student satisfaction with course/instructor and perceived educational outcomes, and (c) increasing the size of lecture classes may have a greater impact on affective outcomes than on cognitive outcomes.

Feldman (1984) completed a meta-analysis of studies that related class size to students' evaluations of their teachers and courses, and made three primary conclusions. He identified that weak inverse associations existed between (a) the size of class enrollment in a college course and students' overall evaluation of the course and its teacher, and between (b) class size and evaluations of instructor skill in presenting material and communicating information. In addition, he identified that larger inverse associations were found between class size and

evaluations of specific instructional dimensions related to instructor interactions and interrelationships with students. More recently, Maxwell and Lopus (1995) completed a cost effectiveness analysis of large and small classes, and found that the monetary savings of dramatically increasing class size had the potential to translate into institutional enrollment losses or internal reallocations of resources between academic departments.

Student Academic Behaviors

Student Note-Taking

While the first body of research literature to set the context for this study focused on individual courses and the effects of their environments on student perceptions, the second body of research literature addresses the academic behaviors of students and methods for learning strategies used to approach individual courses. For example, Hult, Cohn, and Potter (1984) studied effectiveness of student note taking in relationship to learning from a class lecture. They found that note-taking effectiveness (i.e., correct note taking for major idea units) had the strongest relationship to learning outcomes, and that more effective note takers used more techniques to highlight major ideas. Carrier, Williams, and Dalgaard (1988) examined student perceptions of note-taking as related to their overall study routine among students in large lecture courses. Among their results, the authors found that students who indicated less confidence in their note-taking abilities had lower academic performance. More recently, Wilding and Hayes (1992) determined that older students and students who scored high on certain types of learning measures were more likely to demonstrate specific study behaviors. They concluded that relationships between approaches to studying and specific study behavior are more complicated than originally stated.

Student Commitment to Academics

Some research has documented that students possess varying levels of commitment to their academic achievement. Kluger and Koslowsky (1988) measured levels of commitment

among students majoring in Calculus to predict final grades, and found that the students held higher levels of commitment toward calculus coursework and grades than toward humanities coursework and grades. These findings raise important questions about student levels of commitment to courses that are in or out of their academic majors. Van Etten, Freebern, and Pressley (1992) interviewed college students to determine their beliefs about upcoming examinations, and identified that students held a complex set of beliefs about the examination preparation process. The students expressed beliefs about four aspects of exam preparation: (a) motivations to study for exams, (b) strategies for exam preparation, (c) affect about exam preparation, and (d) effects of external factors on study. Finally, in another study that connected student commitment to exam performance (Leeming, 1997), upper division psychology students who made written commitments to study for an exam reported significantly more study time and performed significantly better on the exam than students who did not make such commitments.

One way in which students may demonstrate a low level of commitment is by engaging in academic procrastination. Solomon and Rothblum (1984) investigated the frequency of student procrastination on academic tasks and reasons for procrastination behavior. They completed a factor analysis of the reasons for procrastination that students listed on a procrastination assessment scale, and identified that the factors Fear of Failure and Aversiveness of the Task accounted for most of the variance. Additional results indicated that procrastination is not solely a deficit in study habits or time management, but involves a complex interaction of behavioral, cognitive, and affective components. Clark and Hill (1994) replicated the Solomon and Rothblum (1984) study with African-American college students, and found that a large number of students reported high levels of procrastinating on studying for examinations, writing term papers, and reading weekly assignments. In addition, many students reported that such procrastination was nearly always or always a problem. Factor analysis of the reasons for procrastination identified two primary factors; evaluation anxiety

and task aversiveness, and self-reported procrastination patterns are common among college students.

Student Self-Perceptions of Academic Ability

Student perceptions of themselves may factor into the decision whether to use commercial note-taking services. One way these self-perceptions are constructed is in terms of *academic self-concept*, and has been defined as self-ratings of overall academic ability, drive to achieve, and mathematical ability (House, 1996). Gerardi (1990) investigated academic self-concept as a predictor of academic success for students who have been historically underrepresented in higher education. In this study, first-year students completed a battery of skills assessment tests and a self-concept scale. Although academic self-concept correlated strongly and significantly with grade point average (GPA), Math assessment test scores, reading assessment test scores, and high school GPA scores did not correlate well with college GPA. Additional analysis showed that academic self-concept was the best predictor of academic success. In another study, House (1996) found that academic self-concept and academic achievement expectancy items from the UCLA CIRP survey were significant predictors of subsequent science achievement for students in Chemistry courses.

Another way in which students view themselves is in terms of *academic self-esteem*. Okun and Fournet (1993) hypothesized that students' semester GPA would be (a) positively related to perceived validity of grades scores for high academic self-esteem college students and (b) inversely related to perceived validity of grades scores for low academic self-esteem college students. Results from multiple regression analysis demonstrated that semester GPA and academic self-esteem exerted a joint effect on perceived validity of grades scores. Contrary to the hypothesis, the slope for semester GPA was positive for both low and high academic self-esteem students.

As a result of this literature review, a variety of student academic behaviors provide insights into possible explanations of student use of commercial notetaking services. First, the

social environments of learning in large lecture courses and the concomitant organization and formality may influence students to take advantage of all available academic resources to maximize their academic performance. Second, students may use these services merely as supplementary strategies to their own note-taking efforts regardless of classroom social environments, particularly as in the case of student-athletes, who may be required to miss multiple class sessions. Third, students may engage in academic procrastination, and use commercial coursenotes as a strategy for minimizing the effects of this procrastination. Finally, academic self-esteem or self-concept issues may exert influence on students to use these services, especially those students in competitive institutions who may perceive themselves to be academically underprepared.

Commercial Note-Taking Services

Note-taking services on college campuses have traditionally been implemented in two ways. First, institutional support has been provided through Disabled Student Services offices as reasonable accommodations for students with disabilities. Second, these services have been organized by student volunteers in specific schools or disciplines, including Medical Schools (e.g., Washington University School of Medicine, 1995-96)).

A third form, commercial note-taking services, is the focus of this study. Unfortunately, no previous research has focused on commercial note-taking services, their methods, strategies, reasons why students choose to use them, or their effects on academic performance. These services are a recent phenomenon on some campuses and involve private entrepreneurs who hire note-takers for specific large lecture courses, and the notes are subsequently sold to enrolled students. Sebastian (1995) identified that six commercial note-taking services operate in close proximity to the University of Colorado campus, and these services also exist near the campuses of Penn State, Rutgers, UC-Berkeley, Virginia Tech, and the Universities of Michigan and Washington, among others.

With the arrival of these services, a number of concerns have been identified by faculty and academic administrators. These concerns include that (a) some services have note-takers attend class without obtaining prior faculty permission; (b) students purchase commercial coursenotes as a substitute for regular class attendance (Huang, 1995); (c) these services may violate the Federal Copyright Act regarding control of intellectual property; (d) faculty may inappropriately profit from coursenotes sales; (e) commercial coursenotes are an ineffective substitute in courses that emphasize visual recognition (e.g., art history and classics); (f) questions of accuracy in the content of the commercial coursenotes, and (g) these services represent academic misconduct by violating institutional Honor Codes.

CONCEPTUAL FRAMEWORK

The preceding literature review identified a series of possible influences on student use of commercial note-taking services. Although the central focus of this study addressed student use of commercial note-taking services and their effects on student academic performance, additional variables lay the groundwork for this focus. The independent variables in this study (depicted in Figure 1) are (a) student personal characteristics and (b), student academic background characteristics. The dependent variables in this study are (c) commercial coursenotes use and (d) student academic performance. This study examines the relative influence of these independent variables and of commercial coursenotes use on student academic performance.

– Insert Figure 1 about here –

RESEARCH QUESTIONS

One important aspect that has not been addressed in the literature on academic behaviors involves student use of commercial note-taking services and the effects of their use on academic performance. The purpose of this exploratory study is to examine student academic performance in Chemistry courses within the context of commercial note-taking services as an

individual study strategy while controlling for various student background characteristics. More specifically, three research questions guided the completion of this study:

1). What academic or other background variables predict student use of commercial coursenotes services?

2). What effect does student use of commercial coursenotes or other background variables have on their attendance in the classes?

3). What effect does commercial coursenotes use have on student academic performance?

METHODOLOGY

For several reasons, single-institution studies are useful as exploratory studies on research questions that have not been previously investigated. First, they represent initial rigorous investigations of research questions that provide a framework from which to identify important issues, additional research questions, and appropriateness of specific research methodologies. Second, they result in benchmarking that provides a foundation for single-institution longitudinal research designs as well as cross-institution comparisons. Third, they serve as pilot tests to refine and improve future research studies.

Data Source and Sample

This study draws upon results from a survey distributed to 1874 undergraduate students enrolled in either of two large-lecture Chemistry courses during the Fall Term, 1995 at a large research university (response rate 58.2%). Female students comprised 50.4% (n=945) and Male students comprised 49.6% (n=929) of the sample, while students of color comprised 36.2% (n=679) of the sample, White students comprised 60.4%, and 3.4% did not identify their racial categories.

Measures and Analyses

The 7-item fixed response instrument follows survey design conventions identified by Pribyl (1994) and focused on student self-assessments of their (a) class attendance, (b) faculty-

prepared coursepack use throughout the semester, and (c) commercial coursenotes use throughout the semester. The resulting survey data was merged with student background and academic data to form a more complete profile of the participants and to facilitate in-depth data analysis.

To examine predictors of student coursenotes use and academic performance in the Chemistry courses, we completed a series of linear multiple regressions of the selected independent variables that identified student background characteristics (Race, Sex, High School GPA, High School Calculus coursework, Coursepack use, Commercial coursenotes use, SAT and ACT subscores, University Placement Exam scores) on the dependent variables (Class Attendance and Chemistry course grade). To examine student coursenotes use as an influence on class attendance, we completed a series of Spearman rank correlations between Commercial coursenotes use and Class Attendance. The definitions of the variables used in the regression analyses are shown in Table 1.

-- Place Table 1 about here --

LIMITATIONS

One limitation of this study involves questions regarding the accuracy of student self-reports of class attendance. Students may have demonstrated 'social desirability' while completing the survey by minimizing the number of times they were absent from class. Since collecting attendance data on a regular basis in large lecture courses is not feasible, replication should include attendance data collection in smaller Discussion sections of these courses. A second limitation is that supporting data was not collected in regard to student use of other forms of academic assistance in these courses, such as tutoring, supplemental instruction, peer study groups, and meeting the Teaching Assistant during office hours. As a result, student use of faculty-prepared coursepacks and commercial note-taking services and the effects on academic performance were examined as independent study strategies, when, in fact, they may

be one part of a more involved approach to learning. Finally, only one measure was used to determine academic performance; final grade in the course. To increase reliability, more frequent measures should be taken through the duration of the course.

RESULTS

Effect of Background Variables on Coursenotes Use

In the first analysis, we sought to answer the question, "What kinds of students used Commercial Coursenotes in the Chemistry classes?" Therefore, we investigated the effects of a series of academic background variables in predicting coursenotes use in Chemistry classes. Linear regressions were completed, and the results (summarized in Table 2) show that the lone student background variable predicting coursenotes use is the institutional Math Placement test score ($\beta = -.0769$, $p<.05$). In other words, students with lower Math Placement test scores were significantly more likely to use commercial note-taking services available for the courses. Surprisingly enough, other academic background variables such as ACT and SAT scores and subscales were not significant in predicting student use. It is important to acknowledge that a low Adjusted R2 (.008) limits the extent to which background variables explain coursepack use.

-- Place Table 2 about here --

Effect of Coursenotes Use on Class Attendance

In the second analysis, we addressed the common concern of faculty and administrators that students may use commercial note-taking services as a substitute for class attendance. Spearman rank correlations were completed using the variables 'coursenotes use' and 'class attendance' for each of the three course sections Keeping in mind that correlations range from -1.00 to +1.00, we can observe that the findings indicate only very slight negative and positive correlations between use of commercial coursenotes and attendance:

Section 100: -.003 (Discussion section A)
Section 200: .09 (Discussion section B)
Section 300: .03 (Discussion section C)

Effects of Background Variables on Academic Performance

Third, we attempted to answer the question, "What effect does commercial coursenotes use have on student academic performance?" As a result, we investigated the effect of the same background variables (including faculty-prepared coursepack and commercial coursenotes use) on student academic performance in the Chemistry classes. In this analysis, the regression results (summarized in Table 3) identify several variables that predict academic performance; institutional Math Placement test scores, institutional Chemistry Placement test scores, faculty-prepared coursepack use and commercial coursenotes use.

The first three variables positively predict academic performance, and these results are intuitive. It is reasonable to expect that students who scored higher on institutional placement tests or who used the faculty-prepared coursepack achieved statistically significantly higher levels of academic performance in comparison to students who did not have high scores or use the coursepack. More importantly, however, the fourth variable commercial coursenotes use proved to be a negative predictor of academic performance. In other words, students who indicated that they used the commercial coursenotes in the classes performed at statistically significantly lower levels than did students in the classes who did not use the note-taking services. The Adjusted R2 (.219) indicates a much higher percentage of variance that can be explained in this regression. Surprisingly, other background variables fell out of the regression equation predicting academic performance, including ACT and SAT scores and sub-scores, self-reported High School GPA and High School calculus coursework completed. These results are also consistent with additional analyses of the academic performance of women and students of color in the classes.

-- Place Table 3 about here --

DISCUSSION

The primary goal of this study was to investigate the influence of commercial note-taking services on student academic performance in Introductory, large-lecture Chemistry courses. More specifically, we sought to identify the types of students that use these services, the influence of using these services on students' individual class attendance decisions, and the effects of these services on final grades in the courses. The results suggest three primary implications.

First, little generalization can be made regarding specific academic background characteristics of students most likely to use commercial note-taking services as study strategies in large Chemistry courses. While students place a high value on class notes they write themselves (Carrier, Williams, & Dalgaard, 1988), other factors may discourage students from using commercial coursenotes, such as possessing high levels of academic self-confidence, reliance on peer study groups or other more familiar forms of academic support, and an inability to pay for the services on a continuing basis.

In regard to issues of student academic underpreparedness, it is important to remember that these commercial note-taking services have initially appeared in close proximity to large, selective, academically competitive institutions. As a result, while national trends show that students are entering college less well academically prepared than in the past (Levine & Cureton, 1998), it is less likely that large numbers of these students will enter the types of institutions that have attracted commercial note-taking services in the recent past. Additional research should be conducted to investigate the use of commercial coursenotes services by students with different types of academic backgrounds at different institutional types. By doing so, we can develop initial insights into the role of commercial note-taking services in the learning strategies of academically underprepared students.

Second, the concern that students may use commercial note-taking services as a substitute for class attendance was not borne out in the results. As previously identified in the Limitations section, some questions surround the accuracy of student self-reports of class

attendance. One aspect of the social environment of large lecture classes is decreased levels of group interaction (Meredith & Ogasawara, 1982) that may lead to lower levels of involvement and commitment to these courses. As a result, we recommend the design of more accurate strategies for collecting student attendance data

Third, student use of commercial note-taking services was shown to exert negative effects on their academic performance. This was a counter-intuitive finding, and indicates that additional research on the effects of these services is warranted. This research should investigate the ways that students use commercial notes, including frequency, duration, and individual or group study use. These findings also raise important questions regarding the utility of such services from an institutional standpoint, and provide a benchmark from which additional research should be conducted to guide the development of faculty and administrative policy in response to these academic services.

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Figure 1

Conceptual Framework

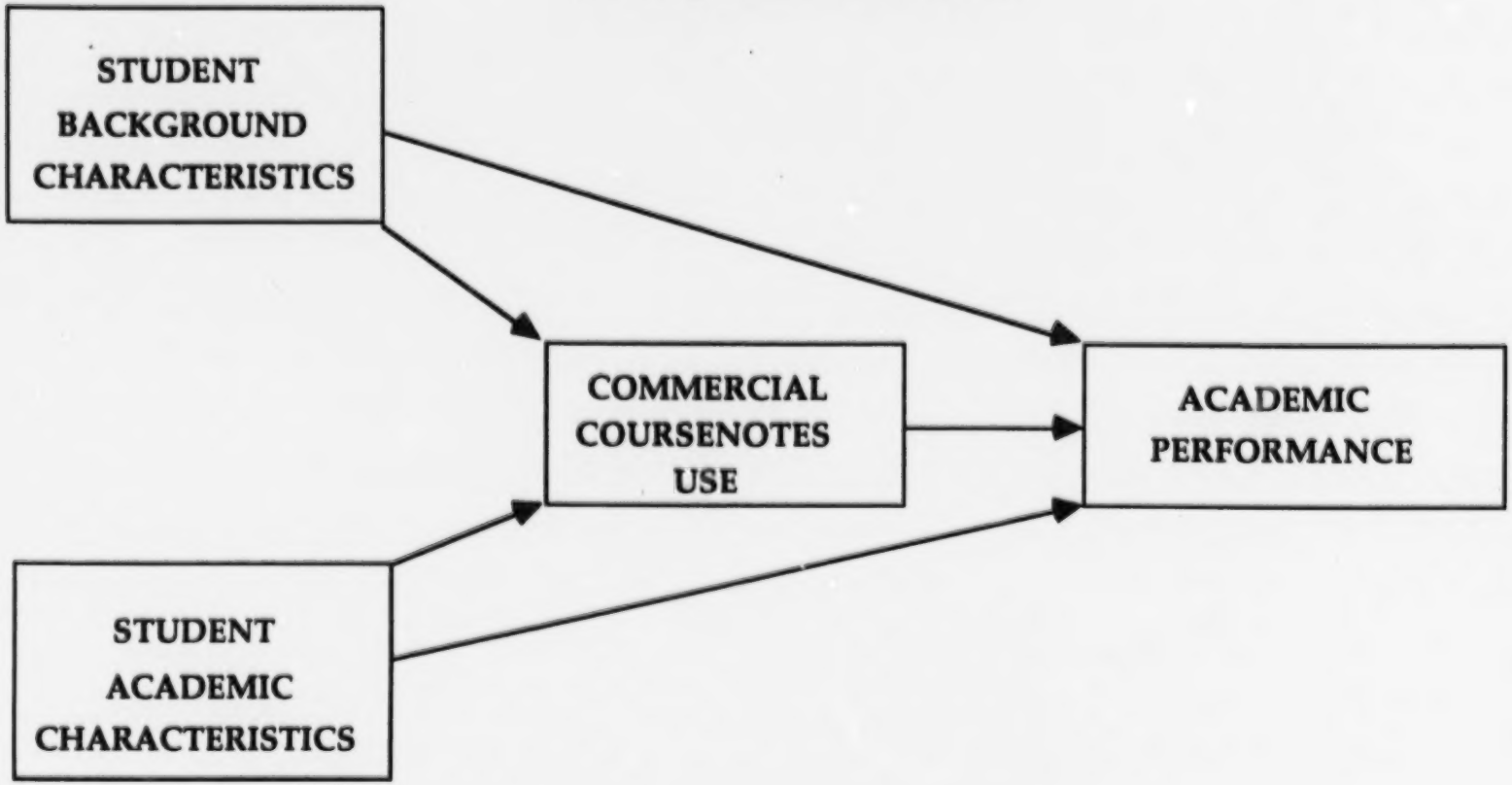

Table 1: Definitions for Variables Used in the Regression Analyses

SAT-Math subscale: 0-800

SAT-Verbal subscale: 0-800

ACT-English subscale: 0-36

ACT-Math subscale: 0-36

ACT-Natural Sciences subscale: 0-36

ACT-Social Sciences subscale: 0-36

ACT-Combined Score: 0-36

Chemistry Placement Test Score: 0-50

Math Placement Test Score: 0-50

High School Calculus coursework
1 = none
2 = completed

Commercial Coursenotes Use
1 = Did not use
2 = Used

Faculty-prepared Coursepack Use
1 = Did not use
2 = Used

Race
1 = White
2 = Student of Color

Academic Performance (Numerical Grade in Course): 0.00-4.00

Gender
1 = Male
2 = Female

Class Attendance: 7-point scale from 'missed none' to 'missed more than 20 class meetings'

Table 2: Regression Analysis of Background Variables on Coursenotes Use

Dependent Variable

Coursenotes Use

Independent Variables	Beta
ACT_COMB	-.129
ACT_ENG	-.037
ACT_MATH	.233
ACT_NATS	-.130
ACT_SOC	.039
MATH_PLA	-.076*
SAT_MATH	-.015
SAT_VERB	.011
Multiple R	.091
R Square	.009
Adjusted R Square	.008

*= Significant at p=.05

Table 3: Regression Analysis for Independent Variables on Academic Performance

Dependent Variable

Grade Received

Independent Variables	Beta
Gradepoint	.118
Coursepack	.239*
Coursenotes	-.139*
SAT_MATH	-.156
SAT_VERB	.158
ACT_ENG	-.039
ACT_MATH	.011
ACT_NATS	.072
ACT_SOC	-.025
CHEM_RT	.158*
MATH_PLA	.152*
HS_CALCU	-.128
Multiple R	.468
R Square	.227
Adjusted R Square	.219

*= Significant at p=.05